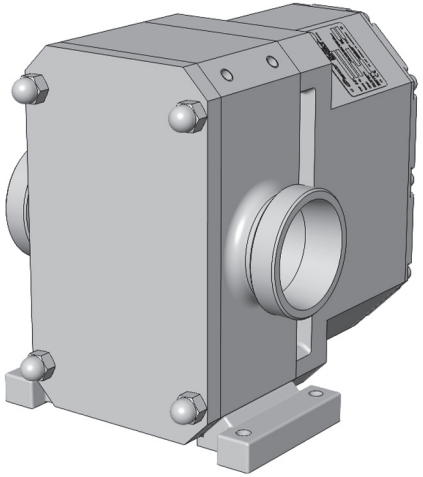
# Operation and Maintenance Manual

(Translation of the original document)

# IHP 100/128



Ingersoll Rand
Industrial Technologies

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# Foreword

Carefully read this Operation and Maintenance Manual before carrying out any operations on the rotary lobe pump IHP 100/128.

The manual contains important instructions which must be followed strictly in order to avoid dangerous situations for users as well as situations that could be harmful to the pump and the environment.

### Scope of application of the operating manual

This Operation and Maintenance Manual is only valid for the pump (and ancillaries) delivered by GHH RAND, not for the overall system the pump is incorporated in.

### Target group

Use of this manual is exclusively restricted to qualified operators and technicians to ensure correct operation and maintenance of the pump.

### Instructions and safety instructions

The following instructions and safety instructions are used in this manual to warn of dangers which could lead to operating errors, injuries and damage to property:

### Safety information – Explanation of safety signal words

**⚠ DANGER**

Indicates an imminently hazardous situation which, if not avoided, will result in death or serious injury.

**⚠ WARNING**

Indicates a potentially hazardous situation, which, if not avoided, could result in death or serious injury.

**⚠ CAUTION**

Indicates a potentially hazardous situation, which, if not avoided, may result in minor or moderate injury or property damage.

**ATEX REQUIREMENTS**

Indicates information related to equipment complying with Directive 94/9/EC.
Listed operations must be carried out only by trained and skilled staff for work in hazardous areas.
Non-observance of above indications may result in serious hazards to health and safety.

**NOTICE**

Indicates information or a company policy that relates directly or indirectly to the safety of personnel or protection of property.

If this manual refers to regulations, directives, standards, etc., the most recent valid issues have to be applied.

No part of this manual may be reproduced by any means, transmitted or copied for public and/or private use without prior authorization by GHH RAND.

The information contained in this manual relates to data in possession of GHH RAND at the time of publication; GHH RAND reserves the right to make any changes to this document at any time without prior notice.

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# 1 General

## 1.1 Application

The rotary lobe pump IHP 100/128 built and supplied by GHH RAND is designed for the operation at and on utility vehicles for the discharge of specific liquids. For use in classified places (with a potentially explosive atmosphere), pump models are available that are designed and made in keeping with the Community Directive 94/9/EC (ATEX Directive). The national and harmonised standards used are those reported in the EC Declaration of Product Conformity; whilst awaiting further technical regulations, the product is marked CE according to these documents.

Different models of sealing systems are available and selectable in accordance with the pumped liquid.

Consult the technical assistance service of GHH RAND in the event of any unforeseen circumstances for uses which are not included in this manual.
See last inside page for contact details.

## 1.2 Manufacturer‘s address

GHH RAND
Schraubenkompressoren GmbH
Max-Planck-Ring 27
46049 Oberhausen
Germany

## 1.3 Identification

The machine data is located on the type plate of the rotary lobe pump.

In order to always have the machine data ready available, we recommend that you enter them into the following blank spaces.

| | |
|---|---|
| **Type** | |
| **Serial No.** | |
| **Year** | |

**NOTICE**

The data on the machine type plate represent a certificate and may not be changed or rendered illegible.

Should the type plate be damaged or missing, the serial number can be found stamped on opposite corners of the rotorcase.

### 1.4 Information for inquiries and orders

In conjunction with inquiries and orders of spare parts and accessories, the entire identification of the pump (as listed in chapter 1.3) for which the spare part or accessory is intended must be indicated.

**⚠ DANGER**

To ensure safety, use original spare parts and accessories authorized by GHH RAND. The use of non-original or non-authorized spare parts and accessories may exempt GHH RAND of any liability for the consequences.

### 1.5 Service locations

For addresses of service locations, please see the last inside page of this manual or the internet page:

http://www.ghhrand.com

### 1.6 Type designation

Along with other information, some important pump data is coded in the pump serial number on the pump type plate.

| | | | | |
|---|---|---|---|---|
| IHP100 | X | Y | ZZZZZZ | (-Ex) |
| IHP128 | X | Y | ZZZZZZ | (-Ex) |
| ↑ ❶ | ↑ ❷ | ↑ ❸ | ↑ ❹ | ↑ ❺ |

❶ Pump model:
The number in the model code indicates the displacement of the pump (Liters/rev. x 0.01).

❷ Seal type:
A – Single O-ring seal
B – Mechanical seal (SiC/SiC)
C – Mechanical seal (Carbon/SiC)
D – Double O-ring seal

❸ Seal housing elastomer type

❹ Further specification according to GHH RAND pump code

❺ Annex “-Ex” (optional):
Ex certification, pump complying with Directive 94/9/EC.

### 1.7 Guarantee

The guarantee for this product is 12 (twelve) months from the date of dispatch from the GHH RAND plant in Oberhausen/Germany.

The guarantee covers any parts and components which may prove to be faulty due to manufacturing flaws or assembly errors.

The guarantee does not cover faults deriving from errors of installation, wiring or calibration carried out by third parties or related to improper use of this equipment.

Gasket and seals are excluded from the guarantee.

GHH Rand reserves the right to repair and/or replace any parts that are, in its unquestionable judgement, faulty.

The guarantee for components and labour is understood as ex factory GHH RAND Oberhausen/Germany, any intervention at the customer’s premises must be explicitly requested and a charge will be made for travel and accommodation.

## 1.8 Operating parameters

| | | Pump model | |
|---|---|---|---|
| Parameter | Measuring unit | **IHP 100** | **IHP 128** |
| Theoretical displacement | Liters/rev | 1.00 | 1.28 |
| | Imp. gal/100 rev | 21.9 | 28.2 |
| | US gal/100 rev | 26.4 | 33.8 |
| Nominal connection size | mm | 55 / 75 | 75 / 100 |
| | in. | 2 / 3 | 3 / 4 |
| Max. differential pressure | bar | 10 | 12 |
| | psi | 145 | 175 |
| Max. speed | rev/min | 1000 | 1000 |
| Max. temperature | °C | 110 | 150 |
| | °F | 230 | 300 |
| Weight | kg | 49 | 67 |
| | lb | 108 | 148 |

In practice the maximum speed and pressure given above may be limited due to the nature of the product to be pumped and/or design of the system in which the pump is to be installed. Please contact GHH RAND for assistance.

**⚠WARNING**

Do not exceed the pumps rated pressure, speed, and temperature, or change the system/duty parameters from those for which the pump was originally supplied, without confirming its suitability for the new duty.
Running the pump outside of its operations envelop can cause mechanical contact, excessive heat and can represent a serious risk to health and safety.

**⚠WARNING**

If the system or product characteristics are to be changed from the original application for which the pump was selected, GHH RAND or their authorized distributor should be consulted to ensure the pump is suitable for the new application.

**⚠CAUTION**

The pump should not be subjected to sudden temperature changes to avoid the risk of damage from sudden expansion/contraction of components.

**Performance curves IHP 100**

The curves in the illustration on the right depict performance of the **pump only**.

Performance will vary in applications due to system design and variables.

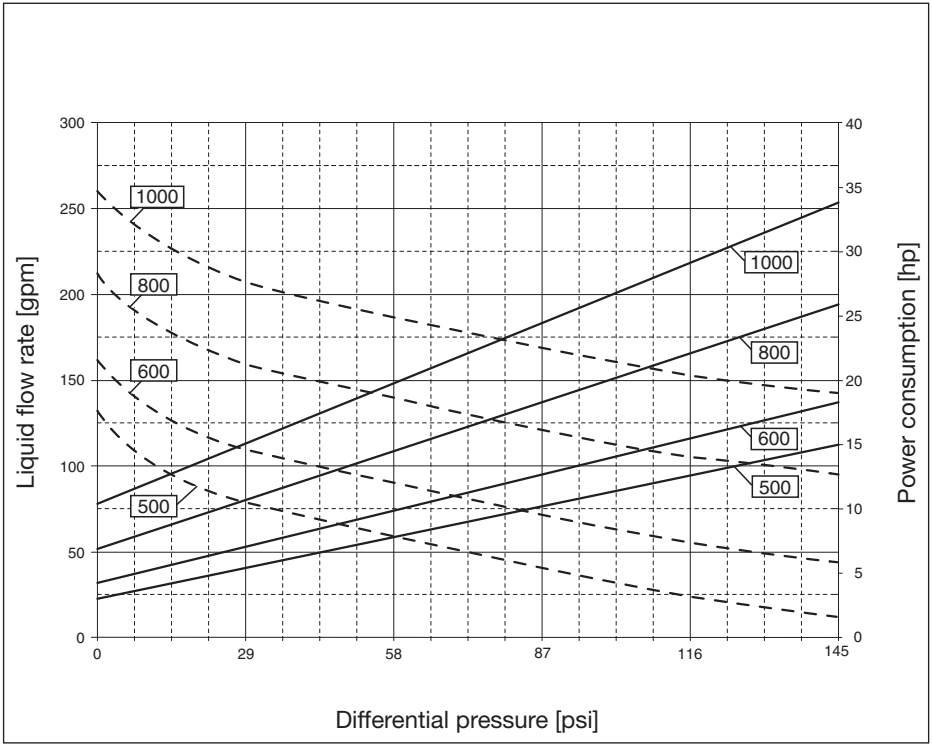
Approximate flow rates and power consumptions are based on 1 cP fluid.

**Signs and symbols**

| | |
|---|---|
| XXX | Curve for XXX rev. per min. |
| ---- | Flow rate curve |
| —— | Power consumption curve |

**NOTICE**

For correct design of the conveying system and calculation of the operating parameters please use the GHH RAND calculation tool.
Please contact GHH RAND or your GHH RAND distributor.



### Performance curves IHP 128

The curves in the illustration on the right depict performance of the **pump only**.

Performance will vary in applications due to system design and variables.

Approximate flow rates and power consumptions are based on 1 cP fluid.

### Signs and symbols

| | |
|---|---|
| XXX | Curve for XXX rev. per min. |
| ---- | Flow rate curve |
| —— | Power consumption curve |

**NOTICE**

For correct design of the conveying system and calculation of the operating parameters please use the GHH RAND calculation tool.
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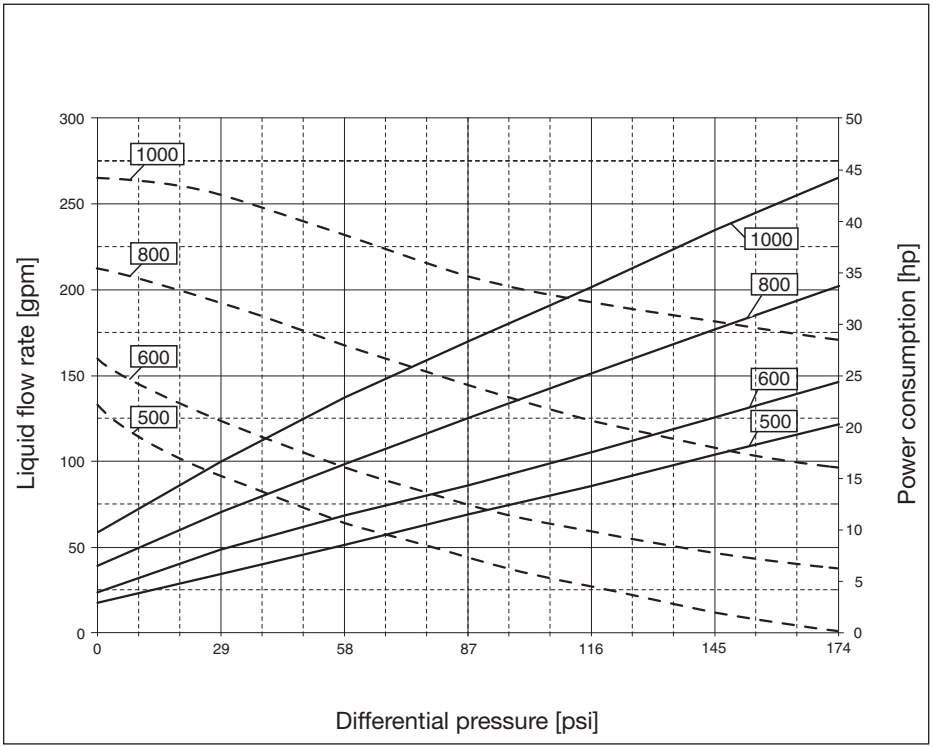
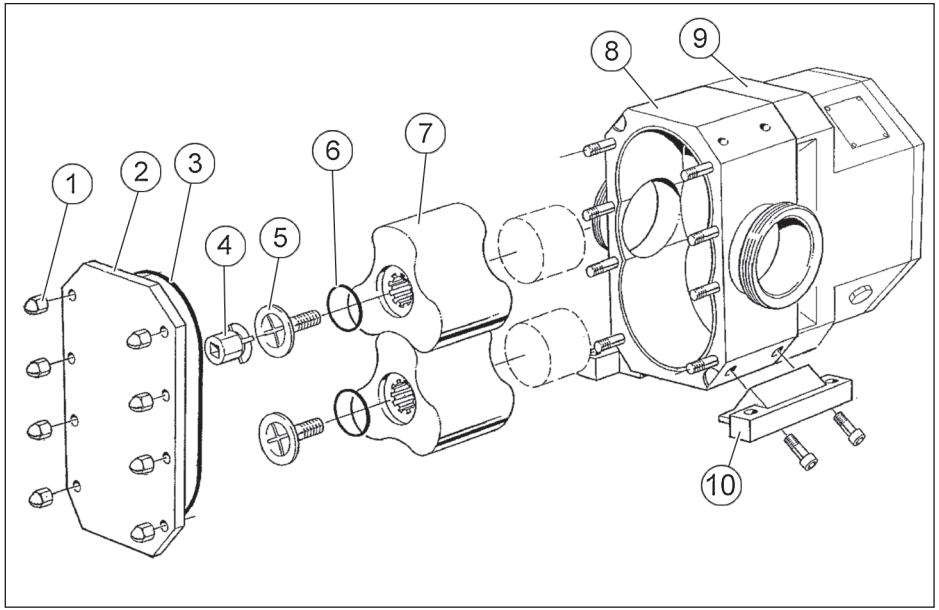


## 1.9 Component overview




| Pos. | Part designation |
|---|---|
| 1 | Dome nut |
| 2 | Front cover |
| 3 | O-ring |
| 4 | Socket (IHP 128 only) |
| 5 | Rotor retainer (IHP 128, IHP 100 with hexagon head) |
| 6 | Retainer O-ring |
| 7 | Rotor |
| 8 | Rotorcase |
| 9 | Gearbox |
| 10 | Mounting foot |

# 2 Safety

## 2.1 General

This manual contains basic information regarding:

– the correct use in line with the safety norms relative to the pump,
– the maintenance (cleaning) of the pump.

**⚠WARNING**

- This manual must be read by the responsible technical staff / operator carrying out any operations on the rotary lobe pump IHP 100/128.
- This documentation must always be preserved and made available to operators and technical staff.

For a better understanding of this manual, we point out the following terms used:

Danger Area
Area inside or near the pump, which constitutes a personal health and safety risk.

Exposed person
Anyone who is completely or partially inside a danger area.

Operator
Person commissioned to install, set into operation, regulate and carry out ordinary pump maintenance.

Qualified technician
Specialised person, suitably trained and authorized to carry out interventions of special maintenance or repairs which require a particular knowledge of the product, its working, safety and methods of intervention.

## 2.2 Danger areas

The pump is not self-operating. When connected to a driving motor, a full risk assessment of the motor pump unit should be carried out by the unit or system manufacturer.

The dangerous pump's areas may be the following:

- close to the drive shaft (catching),
- the pump (hazardous / toxic liquids),
- close to the pump (noise pressure level, to be measured /evaluated after the installation).

**NOTICE**

Additional risks may occur.

For any further detail apply to the user's manual of the equipment where the IHP 100/128 pump has been built in.

## 2.3 Authorized personnel, training and qualification

**⚠WARNING**

- Work performed on the pump and the accessory, such as operation and maintenance, must only be carried out by persons with the appropriate authorization, training and qualification, who are familiar with the valid safety regulations.
- Repair or retrofitting work may only be performed by authorized personnel paying regard to the Installation and Service Manual.
  Specially trained personnel is always available from the service locations or GHH RAND.

## 2.4 Safety-conscious work

The important safety-related regulations for installation, operation and maintenance / repair of rotary lobe pumps are contained in the following publications:

Standards, in particular:

| | |
|---|---|
| EN 12162 | Liquid pumps - Safety requirements |
| EN 1127-1 | Explosive atmospheres - Explosion prevention and protection - Part 1: Basic concepts and methodology |

The following regulations and guidelines are to be observed in addition:

– Material safety data sheets, in particular with regard to explosion protection, handling and storage
– Technical rules for hazardous materials (TRGS)
– Technical rules for operational safety (TRBS)

The most recent valid issues of these regulations apply.

**NOTICE**

- Any special internal legal rules and regulations, particularly safety regulations, which apply due to local conditions, regions or environments must also be observed.
- If there are conflicting regulations, the stricter regulations are to be applied.
  You must also observe any national regulations in the respective country of use.

## 2.5 Safety instructions for the owner / operator

**⚠WARNING**

- The owner / operator is responsible for ensuring that the rotary lobe pump is in safe operational condition.
  Damaged or faulty parts must be replaced immediately.
- Keep safety / warning labels in a readable condition; replace, if necessary.
- It is recommended to wear ear protection when operating this unit, due to the high sound level of the pump during operation.
- Wear protective glasses and other personal protective equipment appropriate to the pumped liquid.
- Make sure that the tank / vessel is ventilated during pump operation.

## 2.6 Unauthorized conversions and spare parts

Conversion and modifications to the rotary lobe pump are not permitted.

**⚠WARNING**

Incorrect installation, operation, or maintenance of equipment may cause severe personal injury or death and/or equipment damage that may invalidate the warranty.

To ensure safety, use original spare parts and accessories authorized by GHH RAND.
The use of non-original or non-authorized spare parts and accessories may exempt GHH RAND of any liability for the consequences.

## 2.7 Incorrect operating methods / prohibited use

In view of the specific use of the pumps, uses other than those described in chapter 1.1 are not foreseen.

In the event of other uses being identified, it is necessary to contact GHH RAND for confirmation of the suitability of the pump for these different uses.

The rotary lobe pump must be operated under the conditions stated in chapter 1.8 “Operating parameters” unless you have approval from GHH RAND stating otherwise.

If labelled accordingly, the pump is designed to be inserted in classified places in accordance with what is stated in the relative EC conformity certificate.

**⚠WARNING**

It is strictly forbidden to install the equipment in danger areas, where there is a level of danger that exceeds what is foreseen by the certificate (see chapter 3).

## 2.8 Disposal / decommissioning

This operation shall be carried out by skilled personnel in compliance with the present laws about safety at work and environmental protection.

**NOTICE**

Dispose of operating materials and parts after use in a proper and environmentally friendly manner in accordance with regional recycling regulations.

**⚠WARNING**

Do not try to use parts or components which might appear to be in good condition, after that following controls, investigations and/or replacements made by authorized and skilled staff have been declared non-conform.

# 3 Information regarding the classification of danger areas

Classification of work places at risk of explosion is of fundamental importance to the safety of personnel and plants and must be carried out in compliance with the existing regulations and laws.

The handling of this subject exceeds the necessary contents of this manual.

Without claiming to exhaust the subject, a brief mention is made of the classification of areas at risk of explosion.

A thorough analysis of the place of installation should be carried out by qualified personnel commissioned by the company that owns the plant.

A brief mention is made to the classification area at risk of explosion, this however is not an exhaustive list, and others may also exist.

## 3.1 Emission sources

Since in an ambience there is a risk of explosion when a flammable gas or vapor mixed with air is present, you need to make sure there are no such substances.

Normally gas and/or vapor (and liquids or solids which can generate them) are enclosed in process equipment.

This equipment is not always perfectly sealed. Therefore you have to identify inside and outside the equipment the places where an explosive ambience could be present.

Every part of the equipment which contains flammable substances must be considered as a potential source of emission of such substance in the surrounding ambience.

When a part is ascertained to be an emission source, its emission rate should be determined looking at its frequency and time.

Emission sources can be classified as “continuous level”, “first level”, “second level” (see par. 2.6 Standard EN 60079-10).

## 3.2 Emission level

As pointed out, three emission levels have been determined listing them from the most to the least explosive ambience due to presence of gas.

- **Continuous level**:
  Continuous emission or long lasting emission.
- **First level:**
  Emission that can occur periodically or occasionally during normal operation.
- **Second level:**
  Unforeseen emission occurring seldom and for a short time during normal operation (see par. 2.6 Standard EN 60079-10).

An emission source can be related to one of the above emission levels or to a mix of them.

### 3.3 Potential explosive atmosphere areas

According to Directive 1999/92/EC the employer divides the areas where explosive atmospheres can form into zones as required by appendix I (see Art. 7 Directive 1999/92/EC).

Definition of areas and their subdivision must meet the requirements of standard EN 60079-10; CEI 64-2; CEI 31-35; CEI 31-35/A.

### 3.4 Danger area, area identification

In the explosion risk areas, determination of danger areas consists of two phases: determination of the type of area, and determination of the area extension. These phases can be not queued as listed.

According to standard EN 60079-10, areas shall be determined depending on emission sources and levels.

Depending on the frequency of formation and the permanence of an explosive atmosphere, dangerous places are classified as follows (see Par. 2.4 standard EN 60079-10 and Art.7 directive 1999/92/EC):

**Zone 0**:
Area where there is an explosive atmosphere permanently, for long periods or often, consisting of a mixture of air and inflammable substances in the form of gas, vapor or fog.

**Zone 1**:
Area where the formation of an explosive atmosphere is probable during normal activity, consisting of a mixture of air and inflammable substances in the form of gas, vapor and fog.

**Zone 2**:
Area where the formation of an explosive atmosphere is improbable during normal activity, consisting of a mixture of air and inflammable substances in the form of gas, vapor and fog and, if this situation arises, it is only for a short period.

**Zone 20**:
Area where there is an explosive atmosphere permanently, for long periods or often, in the form of a combustible dust cloud in the air.

**Zone 21**:
Area where the formation of an explosive atmosphere is occasionally probable during normal activity in the form of a combustible dust cloud in the air.

**Zone 22**:
Area where the formation of an explosive atmosphere is improbable during normal activity in the form of a combustible dust cloud and, if this situation arises, it is only for a short period.

### 3.5 Methods to identify and classify the group and category of the equipments in accordance to Directive 94/9/EC

Annex I of the directive 94/9/EC states the criteria for determining the classification of the equipment in the following groups and relative categories:

**Equipment-group I**

The equipment in this group is intended for working underground, in mines and in their surface plants which are exposed to the risk of emissions of mine gas and/or combustible dust.

**Category M1** :
This equipment must be designed to guarantee an extremely high level of protection.

**Category M2** :
This equipment must be designed to guarantee a high level of protection.

**Equipment-group II**

The equipment in this group is intended for areas where there is an explosive atmosphere due to mixtures of air, gas, vapors, fog or mixtures of air and dust, the probability of which depends on the category.

The equipment in this group must be designed to operate according to the operative parameters fixed by the manufacturer, guaranteeing a different level of protection depending on the category.

| Category | Probability of explosive atmosphere | Equipment protection level |
|---|---|---|
| 1 | Always or often | Extremely high |
| 2 | Possible | High |
| 3 | Unlikely | Normal |

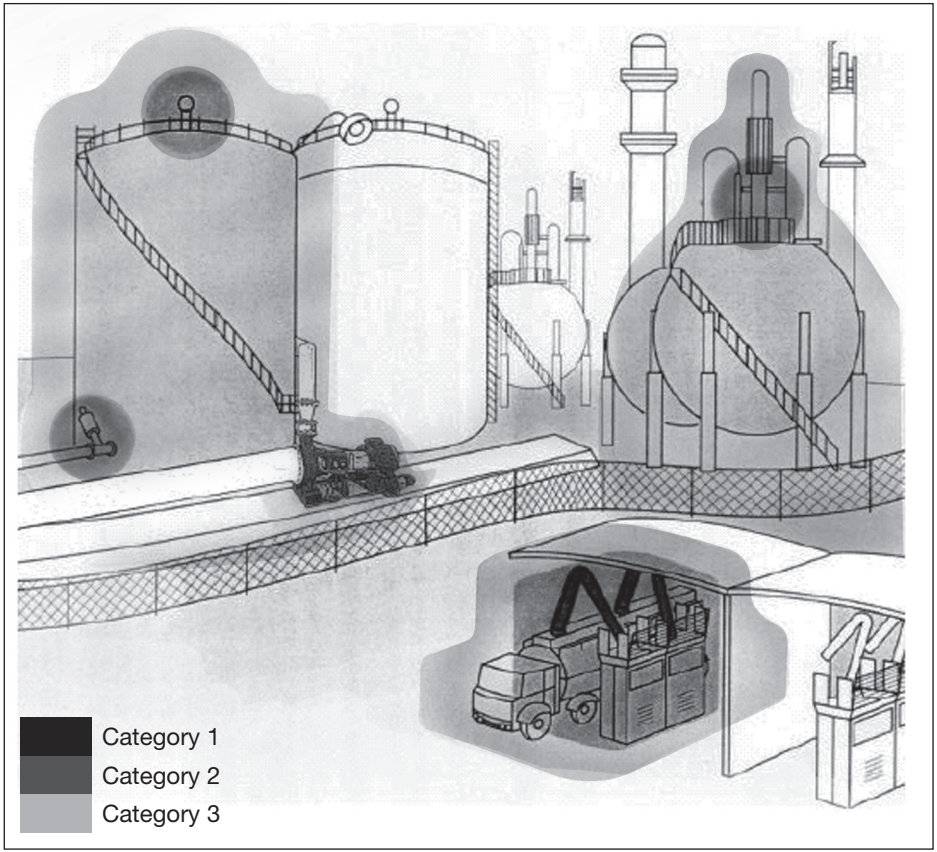
### 3.6 Methods to select the equipment for danger areas

The Directive 1999/92/EC states that: ”If the document regarding the protection from explosions based on an evaluation of the risk does not state otherwise, equipment and protection systems are used in all of the areas where explosive atmospheres may form, corresponding to the categories stated in the Directive 94/9/EEC”.

The correspondence between the zones and categories of equipment (provided that they are suitable according to the cases with gas, vapors or fog and/or dust) is as follows (see annex II point B, Directive 1999/92/EC):

- In zone 0 or in zone 20 :
  => category 1 equipment;
- In zone 1 or in zone 21 :
  => category 1 or category 2 equipment;
- In zone 2 or in zone 22
  => category 1, 2 or 3 equipment.

Purely by way of example the adjacent figure gives an indication of the categories, which may apply in an oil product deposit.



# 4 Operation

## 4.1 Safety during operation

**⚠WARNING**

- Wear protective glasses and other personal protective equipment during operation according to the pumped liquid and the valid local standards and legal regulations.
- First of all, the pump / discharge system has to earthed to avoid a potential charge difference that could cause a spark!
- The pump may, under certain operating conditions, reach high temperatures.
  Risk of burns from hot machine parts.
  Avoid contact with hot parts of the pump and/or pump drive.
  Wear protective gloves!
- See also the safety instructions in Chapter 2 “Safety”.

**⚠WARNING**

- Do not exceed the pumps rated pressure, speed, and temperature, or change the system/duty parameters from those for which the pump was originally supplied, without confirming its suitability for the new duty. Running the pump outside of its operations envelop can cause mechanical contact, excessive heat and can represent a serious risk to health and safety.
- Operate the machine only with all guards in place and in perfect working order.
- In case of fire, do not use water for fire extinguishing in presence of electrical equipment.

**NOTICE**
In case of unusual operating noises, immediately switch off the pump.
For possible causes and actions to be taken, see chapter 6 “Faults and possible causes”.

**⚠CAUTION**

The pump should not be subjected to sudden temperature changes to avoid the risk of damage from sudden expansion/contraction of components.

**NOTICE**

Installation and operation of the pump must always comply with all applicable health and safety regulations.

## 4.2 Switching on

**⚠WARNING**

Do not operate the pump if

– the front cover is not installed correctly.
– any guards are missing or incorrectly installed.
– the suction and discharge piping is not connected.

**⚠CAUTION**

Before operating the pump, be sure that it and all parts of the system to which it is connected are clean and free from debris and that all valves in the suction and discharge pipelines are fully opened.

**⚠WARNING**

Ensure ventilation of the tank/vessel to be discharged to prevent vacuum build-up and possible implosion.

- Check that all piping and associated equipment are clean and free from debris and that all pipe connections are secure and leak free.
- Ensure product is available in the tank.
- Fully open both suction and discharge valves.

**⚠CAUTION**

Do not allow pump to operate with a closed/blocked discharge unless a pressure relief device is incorporated.

The pumps are of the positive displacement type and should therefore never be operated against a closed valve as this would result in pressure overload, resulting in damage to the pump and possibly the system.

If an integral relief valve is incorporated into the pump, do not allow recirculation through the relief valve for extended periods; continuous operation of the pump with the valve open is not recommended and may cause severe damage to the pump.

If the system is equipped with heating/cooling devices, the heating/cooling media should be circulated 15-20 minutes prior to pump start-up.

- Switch on the pump drive.

### 4.3 Monitoring operation

**⚠ DANGER**

In case of unusual operating noises, immediately switch off the pump.
For possible causes and actions to be taken, see chapter 6 “Faults and possible causes”.

- Check that there are no leaks from flanges and covers.
- Make sure transfer hoses are not worn out or ‘kinked’.

**⚠ DANGER**

A kinked hose can cause excessive pump discharge pressure.

- During operation, check the operating parameters (system pressure, revolution speed, etc.) to ensure the operating limits (refer to chapter 1.8) are not exceeded.
- Ensure the pump will not run dry.

**⚠ CAUTION**

Mechanical seals require a thin fluid film to lubricate the seal faces.
Dry running will cause excessive heat and seal failure.

- In case of trouble, switch off the pump.

### 4.4 Switching off

- Switch off the pump drive.
- Close both the suction and discharge valves.
- Drain and purge the pump head.

If the system is equipped with heating/cooling devices, the heating/cooling media should be allowed to circulate 15-20 minutes after the pump has been shut down.

Where a CIP (Cleaning In Place) cycle is employed as part of the process, the heating/cooling media should continue to be circulated during the cleaning cycle.

## 4.5 Cleaning

The pump is suitable for both manual cleaning and CIP (Cleaning In Place).

When cleaning, either manually or by CIP method, the operator must ensure that a suitable procedure is used in accordance with the system requirements.

### 4.5.1 CIP procedure

The system builder has to determine a procedure to ensure that the pump is effectively cleaned. See Installation & Service Instructions for further information.

During a CIP cleaning cycle, a pump differential pressure of between 2 and 3 bar (30 to 45 psi) is recommended to ensure suitable velocities are reached within the pump head.

### 4.5.1 Manual cleaning

Before undertaking any work on the pump the shutdown procedure should be followed (see section 4.4), and site safety practices must be observed.

**⚠WARNING**

Do not attempt any manual cleaning or disassembly of the pump or pump unit without first ensuring that:

– The pump is fully isolated from the power source (electric, hydraulic, pneumatic). Ensure the pump can not be restarted, if necessary, with the aid of another person.

– The pumping chamber, pneumatic relief valve and any shaft seal support system are depressurized and purged.

– Any temperature control devices (jackets, heat-tracing, etc.) are fully isolated, that they are depressurized and purged, and components are allowed to reach a safe handling temperature.

In order to clean the pump manually, the pump cover has to be disassembled, and both the rotors and the product seals have to be removed.

**⚠WARNING**

Do not place fingers, etc. into the pumping chamber or its connection ports if there is any possibility of the pump shafts being rotated.
Severe injury will occur.

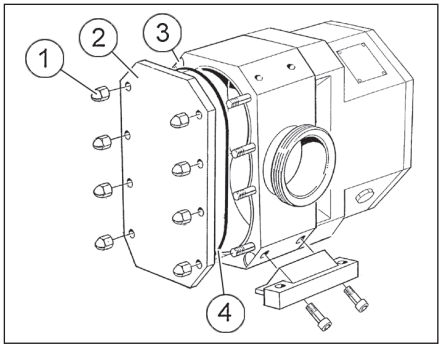
**⚠ CAUTION**

During dismantling or before assembly all components should be inspected for fit, wear, and damage. If worn or damaged the components should be replaced before re-assembly.

**NOTICE**

The position of all parts should be identified as they are removed to ensure they are reinstalled in the same position.

**Pump cover disassembly**

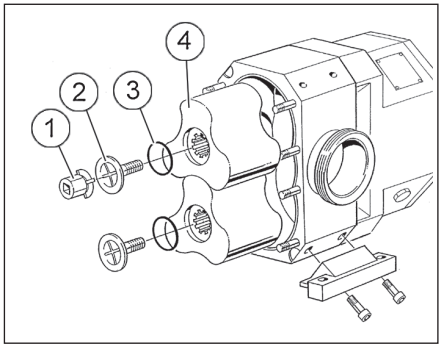



- Gradually loosen front cover retaining nuts (1).

**⚠WARNING**

Care should be taken as residual product and pressure may still be present in the pump head.
As the nuts are loosened this will vent to atmosphere.

- Remove front cover retaining nuts (1).
- Remove front cover (2). If necessary, loosen the front cover using a lever applied at the lever slots (3) at opposite corners of the rotorcase.
- Remove the front cover O-ring (4) from rotorcase.




- Remove rotor retainers (2) using the socket (1) provided.

**⚠CAUTION**

For the rotors of the IHP 128 pump, the provided socket (1) should always be used. The use of other tools may damage the retainer.

**NOTICE**

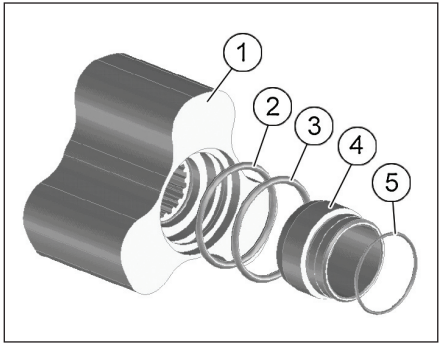
For the IHP 128 pump, the rotor retainer is provided with a hexagonal screw.

- Remove retainer O-ring (3).
- Remove rotors (4) from shafts (not shown), taking care not to damage the product seal components.
  Where viscous products are employed, a tool is available utilizing the three M6 tapped holes, to aid in the removal of the rotors.
- Remove O-rings from drive shafts.
- Remove the product seals from the rotors, refer to the respective section for the different pump models and fitted seal assembly.

**Product seal removal (O-ring seal, IHP 100 only)**

**⚠ CAUTION**

Extreme care should be taken when carrying out these procedures to ensure that the O-ring grooves, sleeve faces and O-rings are not damaged.




- Pull out the seal cartridge (4) from the rotor (1) and carefully remove the O-rings (2 [double O-ring seals only], 3, and 5).

**⚠ CAUTION**

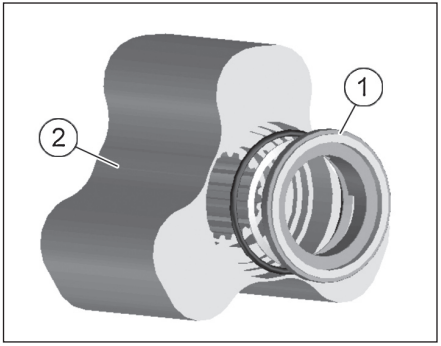
When reassembling the **single O-ring seal**, make sure that O-ring (3) is set into the outer O-ring groove of the rotor (1).

- Clean the disassembled parts thoroughly.
- Inspect the O-rings; ensure that O-rings are not cut, swollen, or cracked. Replace if required.

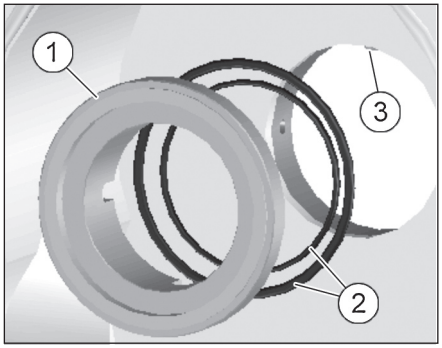
**Product seal removal (Mechanical seal, IHP 100 only)**

**⚠ CAUTION**

Mechanical seals are precision-engineered assemblies incorporating finely lapped seal faces and seats. They must therefore be handled with care.




- Remove the rotary face seal (1) from the rotor (2) using the provided seal extractor tool or a small slotted screwdriver.




- Pull static face seal (1) out from the rotorcase and remove O-rings (2).
- Clean the disassembled parts thoroughly.
- Inspect O-rings and seal face; ensure that seal faces are undamaged and the O-rings are not cut, swollen, or cracked. Replace if required.

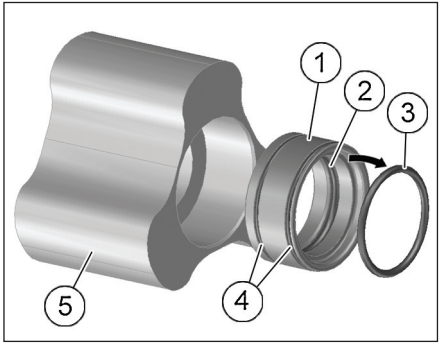
**⚠ CAUTION**

Where mechanical seals are to be reused ensure that seal components are kept in their appropriate sets.
Do not mix old and new seal faces on the same seal.

**Product seal removal (O-ring seal, IHP 128 only)**

**⚠ CAUTION**

Extreme care should be taken when carrying out these procedures to ensure that the O-ring grooves, sleeve faces and O-rings are not damaged.




- Pull out the seal cartridge (1) from the rotor (5) and carefully remove the O-rings (2 [double O-ring seals only], 3, and 4).

**⚠ CAUTION**

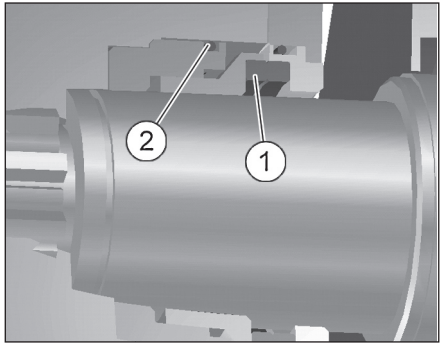
When reassembling the **single O-ring seal**, make sure that O-ring (3) is set into the correct O-ring groove of the seal cartridge (if the seal cartridge is set into the rotor, the O-ring should be seated in the outward groove).

- Clean the disassembled parts thoroughly.
- Inspect the O-rings; ensure that O-rings are not cut, swollen, or cracked. Replace if required.

**Product seal removal (Class 1 hygienic mechanical seal, IHP 128 only)**

**⚠ CAUTION**

Mechanical seals are precision-engineered assemblies incorporating finely lapped seal faces and seats. They must therefore be handled with care.




- Remove the rotary face seal (1) from the rotor taking care not to damage the O-ring (2).
- Clean the disassembled parts thoroughly.
- Inspect O-ring and seal face; ensure that seal faces are undamaged and O-rings are not cut, swollen, or cracked. Replace if required.

**⚠ CAUTION**

Where mechanical seals are to be reused ensure that seal components are kept in their appropriate sets.
Do not mix old and new seal faces on the same seal.

**Re-assembly**

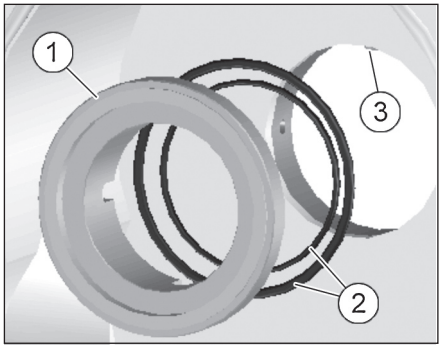
Assembly of the product seals is analogously the reverse of the removal procedures.

> **⚠ CAUTION**
>
> Ensure that all seals are clean and free from damage.
>
> For mechanical seals, if seals are to be refitted, ensure that seals faces remain matched.

Pay attention to the specified tightening torques given below:

| Pump component | Tightening torque |
|---|---|
| Front cover retaining nuts | M12: 102 Nm<br>M10: 58 Nm |
| Rotor retainer | 109 Nm |

**Only for IHP 100 mechanical seal:**




> **⚠ CAUTION**
>
> When reinstalling the static face (1) in the rotorcase, make sure that the slot in the static face lines up with the pin (3) in the rotorcase.

## 4.6 Storage

Before the machine is installed, or if it has been removed from the vehicle it should be stored in a clean and dry place. It is recommended that storage temperature should be between –10°C and +40°C (14°F and 105°F).

# 5 Maintenance

ICP pumps are shipped fully lubricated with a lithium based extreme pressure lubricant suitable for pump service life. Therefore no regular maintenance is needed.

It is only recommended that the exterior of the pump be cleaned periodically according to the actual needs.

**NOTICE**

Safety information labels/plates must be always perfectly visible and not damaged.

**⚠WARNING**

Do not carry out self-repairs: contact qualified technicians for this.

For pump repair/reconditioning, see Installation and Service Instructions.

# 6 Faults and possible causes

**If in doubt, turn off the pump!**

| Fault | Possible cause | Remedy |
|---|---|---|
| No flow | Incorrect direction of rotation. | Reverse motor. |
| | Pump not primed. | Expel gas from suction line / pump chamber and prime. |
| | Gas in suction line. | |
| | Insufficient NPSH (Net Positive Suction Head) available. | Increase suction line and static suction head diameter.<br>Simplify suction line and reduce length.<br>Reduce pump speed and product temperature. |
| Irregular flow | Insufficient NPSH available. | Increase suction line and static suction head diameter.<br>Simplify suction line and reduce length.<br>Reduce pump speed and product temperature. |
| | Product vaporising in suction line. | |
| | Air entering suction line. | Remake pipework joints. |
| | Gas in suction line. | Expel gas from suction line / pump chamber and prime. |
| | Insufficient static suction head. | Raise product level to increase static suction head. |
| Under capacity | Insufficient NPSH available. | Increase suction line and static suction head diameter.<br>Simplify suction line and reduce length.<br>Reduce pump speed and product temperature. |
| | Product vaporising in suction line. | |
| | Air entering suction line. | Remake pipework joints. |
| | Gas in suction line. | Expel gas from suction line / pump chamber and prime. |
| | Insufficient static suction head. | Raise product level to increase static suction head. |
| | Product viscosity too low. | Increase pump speed / Increase product temperature. |
| | Product temperature too high. | Cool product / pumping chamber. |
| | Discharge pressure too high. | Check for blockages / Simplify discharge line. |
| | Pump speed too low. | Increase pump speed. |

**If in doubt, turn off the pump!**

| Fault | Possible cause | Remedy |
|---|---|---|
| Pump overheats | Product viscosity too high. | Decrease pump speed / Increase product temperature. |
| | Product temperature too high. | Cool product / pumping chamber. |
| | Discharge pressure too high. | Check for blockages / Simplify discharge line. |
| | Rotorcase strained by pipework. | Check pipe alignment /support pipework. |
| | Seal flush inadequate. | Increase seal flush to required pressure / flow. |
| | Bearing / timing gear wear. | Replace worn components. |
| Motor overheats | Product viscosity too high. | Decrease pump speed / Increase product temperature. |
| | Product temperature too low. | Heat product / pumping chamber. |
| | Discharge pressure too high. | Check for blockages / Simplify discharge line. |
| | Rotorcase strained by pipework. | Check pipe alignment /support pipework. |
| | Pump speed too high. | Decrease pump speed. |
| | Seal flush inadequate. | Increase seal flush to required pressure / flow. |
| | Bearing / timing gear wear. | Replace worn components. |
| Excessive rotor wear | Product viscosity too high. | Decrease pump speed / Increase product temperature. |
| | Unexpected solids in product. | Clean system. Fit strainer on suction side of pump. |
| | Rotorcase strained by pipework. | Check pipe alignment /support pipework. |
| | Seal flush inadequate. | Increase seal flush to required pressure / flow. |
| | Bearing / timing gear wear. | Replace worn components. |
| Excessive seal wear | Unexpected solids in product. | Clean system. Fit strainer on suction side of pump. |
| | Seal flush inadequate. | Increase seal flush to required pressure / flow. |
| | Bearing / timing gear wear. | Replace worn components. |

**If in doubt, turn off the pump!**

| Fault | Possible cause | Remedy |
|---|---|---|
| Noise / vibration | Insufficient NPSH available. | Increase suction line and static suction head diameter.<br>Simplify suction line and reduce length.<br>Reduce pump speed and product temperature. |
| | Product vaporising in suction line. | |
| | Air entering suction line. | Remake pipework joints. |
| | Gas in suction line. | Expel gas from suction line / pump chamber and prime. |
| | Insufficient static suction head. | Raise product level to increase static suction head. |
| | Product viscosity too high. | Decrease pump speed / Increase product temperature. |
| | Product temperature too high. | Cool product / pumping chamber. |
| | Unexpected solids in product. | Clean system. Fit strainer on suction side of pump. |
| | Discharge pressure too high. | Check for blockages / Simplify discharge line. |
| | Rotorcase strained by pipework. | Check pipe alignment /support pipework. |
| | Pump speed too high. | Decrease pump speed. |
| | Seal flush inadequate. | Increase seal flush to required pressure / flow. |
| | Bearing / timing gear wear. | Replace worn components. |
| Seizure | Unexpected solids in product. | Clean system. Fit strainer on suction side of pump. |
| | Discharge pressure too high. | Check for blockages / Simplify discharge line. |
| | Rotorcase strained by pipework. | Check pipe alignment /support pipework. |
| | Seal flush inadequate. | Increase seal flush to required pressure / flow. |
| | Bearing / timing gear wear. | Replace worn components. |
| Pump stalls on start-up | Product viscosity too high. | Decrease pump speed / Increase product temperature. |
| | Product temperature too high. | Cool product / pumping chamber. |
| | Product temperature too low. | Heat product / pumping chamber. |
| | Discharge pressure too high. | Check for blockages / Simplify discharge line. |
| | Bearing / timing gear wear. | Replace worn components. |

# Notes



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# Service

**OEM Systems**
**Ingersoll Rand Industrial Technologies**
**800-B Beaty Street**
**Davidson, NC 28036, USA**

| | | |
|---|---|---|
| Service / Spare Parts | Tel. | (+1) 704 655 - 4715 |
| | Fax | (+1) 704 655 - 4725 |

**GHH RAND Schraubenkompressoren GmbH**
**Max-Planck-Ring 27**
**46049 Oberhausen, Germany**

| | | |
|---|---|---|
| Service Hotline | Tel. | (+49) 208 / 999 - 4177 |
| Service | Tel. | (+49) 208 / 999 - 4170 |
| | | (+49) 208 / 999 - 4201 |
| Spare Parts | Tel. | (+49) 208 / 999 - 4171 |
| | Fax | (+49) 208 / 999 - 4179 |
| E-Mail | | tanker-solutions@irco.com |
| Internet | | www.ghhrand.com |

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The technical details are subject to change and may vary from the information and illustrations in the operating manual.

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